The Butterfly Effect

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Harnessing the spirit of residents, schools, organizations, places of worship, and businesses to create a greener community.

Contents

Cover: "This year it seemed the giant swallowtail was almost everywhere. Many other nature observers in my region were reporting the same. I live in the Twin Cities in Minnesota and we normally don't see this butterfly. For part of the early season, it seemed these swallowtails were even outnumbering my monarch sightings. With unique yellow dots on its black-colored top side, and a wingspan up to five inches across, the giant swallowtail is pretty unmistakable. They tend to flutter their wings so quickly while feeding from flowers that you need to use camera settings normally reserved for a hummingbird in order to capture a photo that isn't blurry." Pictured here: giant swallowtail butterfly nectaring on rose milkweed (*Asclepias incarnata*). - Travis Bonovsky, nature photographer **Left:** The amazing plants of the Beckman Lake Mat at Cedar Creek Ecosystem Science Reserve.

For the Earth Warriors...

by Chris Heeter

It used to be that weather was the thing you talked about–
at least in the Midwest–
when there was nothing else to say.
It followed 'Hello' and a mumbled 'How ya doing'
with no expectation of a lengthy reply.

It quickly moved from there to temperatures, wind, or rain fall.
Something you could really sink your teeth into.
It had to do with altered outdoor plans
or rain needed for crops and gardens.
Here in the northland it was about wind chill
and how the old timers used to walk to school
in inclement weather without whining.
That sort of thing.

But these days, talk of weather has changed.
What was once unusual has become the norm.
Hurricanes, droughts, high and low temps—
all are off the charts we've faithfully kept all these years.

Indeed even habitats have changed.
What once supported moose, for example,
has shifted as temperatures climb
expanding the range of deer
bringing parasites and heat stress.

You know this already…or are quickly catching on.
What are we to do with what we know?
At best we feel a dull ache and concern
other times full on foreboding.

Most of us channel this into action of some kind—
at large or at home, we do what we can
and try to do more.

It's frustrating and terrifying
but there is no temptation to look away.
We feel this in our bones as beings on this planet.
It is a deep inner knowing of something profoundly out of balance.

If this were a pretty poem, it would wrap up now
with something tidy and neat
about how we will find our Weh.

But this is a gritty poem that knows better.
It joins the chorus of millions upon millions
of voices, hearts and souls
that cry out and will not look away.

So here it is, what I can offer is this…
in your darkest places and times
when your love and actions on behalf of all things Wild
feel not nearly enough,
remember you are not alone.

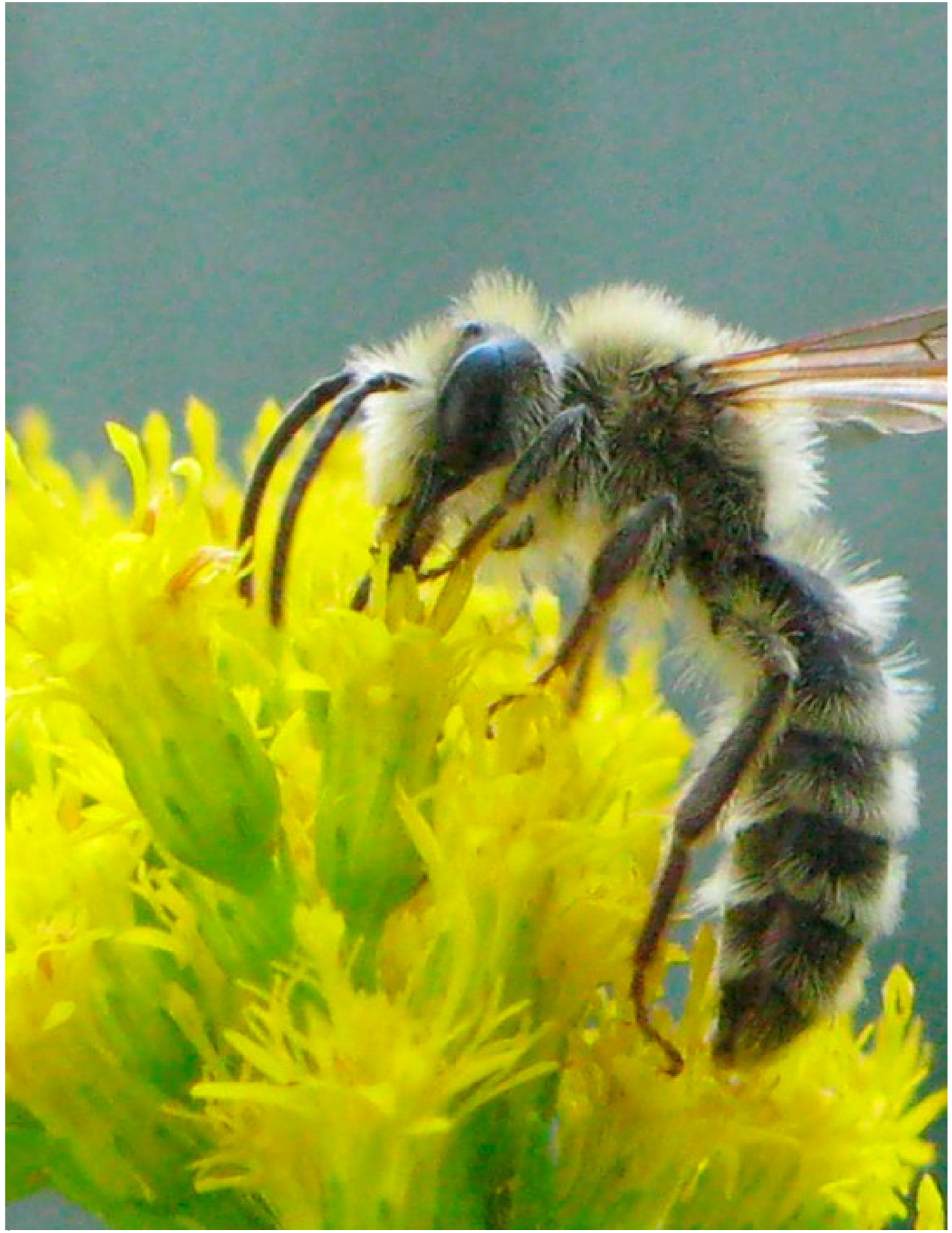
There are countless like-minded Wild souls here with you
also aware, also not willing to look away.
You can take heart in that.

We are a crafty lot.
And when you need to sigh or cry or fall apart
there are others here to help you pick up the pieces
and begin again. And again.

Until we tilt the circumstances
or die trying.

This beautiful world is worth it.
And you, Earth Warrior, are part of that beauty.

Thank you to Chris Heeter of the Wild Institute for generously giving permission to print her poem. Learn more about The Wild Institute and wilderness guide, leadership speaker, and poet, Chris Heeter, here.



From a Plant's Point of View, Specialist Bees Are a Benefit

by Dave Crawford

Let's suppose you're shopping for hot sauce. You probably have a favorite brand. You may be very firm about it. Let's say you'd definitely buy Tabasco, but you'd rarely buy any other brand. To the manufacturer of Tabasco, you're a more valuable customer because you stick to that brand.

Now let's say you're a bee. You could sip nectar and eat pollen from any flower you find, or you could have "brand loyalty." Let's say you always do your dining at prairie clover, as long as it's available. From a plant's point of view, you're a valued customer if you most often dine at the same species, because you're more likely to spread that species' pollen to other flowers of the same species, where it can pollinate those flowers' seeds.

Certain bee species do have brand loyalty, particularly when it comes to pollen. It's more than just a bee figuring out the most efficient way to get food from a particular size and shape of flower, and then sticking with that flower species because it's familiar and easy. Some bee species intentionally seek pollen from certain plant species right from the start. For example, *Colletes aberrans*, with the unimaginative common name "aberrant cellophane bee," seeks out pollen from the genus *Dalea*. Just as you'll find monarch caterpillars munching on milkweed and nowhere else, you'll find *Colletes aberrans* foraging for food on prairie clover flowers. It's not just a preference, it's effectively a dietary requirement.

The Polylecty–Oligolecty Spectrum: Degrees of Pollen Specialization

Among native bee species, some forage on any flower species they can get at effectively. Our many species of bumblebees are one example. They fall near the polylecty (meaning: gather from many) end of the spectrum. Any pollen and nectar will do. Aberrant cellophane bees fall near the oligolecty (gather from few) end. Bee species at the extreme oligolectic end of the spectrum, collecting pollen from just one species, are described as monolectic, although that term is sometimes also applied to bees who take pollen from only a single genus, like aberrant cellophane bees on *Dalea* species.[1] Prairie clover gets a benefit from aberrant cellophane bees because they focus just on prairie clover flowers. No side- trips to other flowers, no pollen wasted by being delivered to the wrong address.

Left: Hairy-banded mining bees provision their nest cells with pollen mainly from asters and goldenrods.

Bee Lawns and Pollen Specialists

As an effort to make lawns less harsh on the environment and more useful to pollinators, bee lawns are an improvement on pure turf grass. But how many North American bee species are specialists on European white clover, creeping thyme, or dandelions? These plant species can benefit generalist bees, but offer virtually nothing for specialists. Thirty to 50 percent of native bees specialize to some degree. For the greatest support to bee diversity and nutrition, your efforts will pay off much more if you plant gardens that include a wide diversity of *native* plant species.

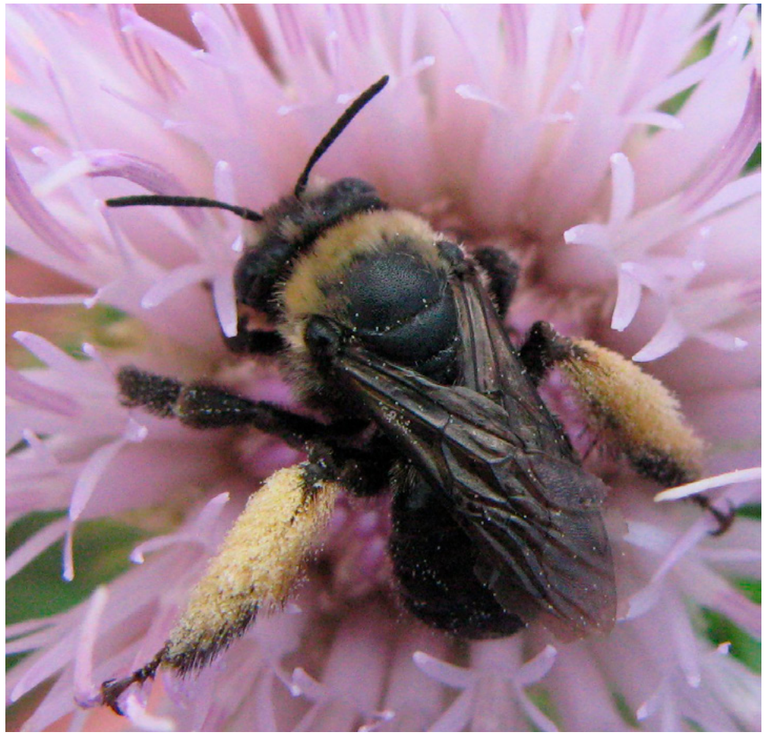
What's in it for the Bees?

The benefits to a bee who's a pollen specialist are still being researched. It may be that the pollen of certain flowers is easier to digest for certain bee species, or that it provides critical micronutrients not found in other pollen.[2] Or it may be that specialist bees simply don't recognize other flowers as food sources at all. Bees respond to olfactory cues in the scent emitted by flowers, and some scents may be interpreted as "yum," while others are more like "yuck," or perhaps just "meh."

Dave Crawford is a retired Minnesota State Park naturalist who has replaced most of his lawn with native plants. He documents visiting pollinators for fun and as a way of learning more about them. All photos are courtesy of the author.

[1]In North America, one example of a thoroughly monolectic species is the pickerelweed shortface bee (*Dufourea novaeangliae*), which forages only on the species *Pontederia cordata*, pickerelweed.

[2] Some bee species have specialized shapes to their legs that are perfectly matched to the most efficient way to loosen pollen from just one or a few flower species.



Right (clockwise from top): Bumblebees are non-specialists. Pollen from most any flower will suit them. Pictured here: boreal (above) and brown-belted (below) bumblebees on native field thistle; Pollen is a source of protein, which is critical for reproductive success, while nectar mainly provides carbohydrates. Aberrant cellophane bees (pictured on native downy prairie clover) are pollen specialists. They seek pollen only from the genus *Dalea*; Thistle longhorn bees are specialists on pollen from thistles. **Previous spread:** Sunflower burrowing resin bees specialize on pollen from sunflowers (*Helianthus*), early sunflower (*Heliopsis*), coneflowers (*Rudbeckia*), and rosinweeds (*Silphium*).

How to Garden and Landscape for Butterflies

by Alan Branhagen

Butterflies are likely the most beloved and recognizable group of insects because of their striking wing coloring and patterning. Butterflies are a subset of moths in the order Lepidoptera. Because our North American butterflies are active during the day, and no species is a pest to the average person, they get more respect than their mostly less charismatic moth cousins. Butterflies have a complete metamorphosis. The life cycle starts as an egg that hatches into a caterpillar. The caterpillar voraciously eats plants to grow and then at a certain stage forms a chrysalis to prepare for its miraculous transformation into an adult butterfly. In much of the United States, the dazzling monarch is the most recognizable of our butterflies and in recent decades has become the poster child for all butterflies.

I'm over 60 years old and have been interested in butterflies since I was a wee one. I remember catching my first butterfly by hand—an orange sulphur—then known as the alfalfa butterfly. Butterflies were abundant when I was a child growing up in northeast Iowa near the banks of the Upper Iowa River. If only I had a cell phone camera like today's children, I could prove that the "new normal" of butterfly diversity and abundance is NOT normal. My memories seem like a fantasy now. Across the street from where I grew up in meadows and alfalfa fields I could find olympia marbles; American, bronze, purplish and gray coppers; Milbert's tortoiseshells; aphrodite fritillaries; and long dash skippers. All of these are now gone, although I did see a gray copper a few years ago, decades after its disappearance. Still-present butterflies are in greatly reduced numbers.

It's not my brain embellishing fond childhood memories. Local to international research validates my butterfly memories. Dr. Kirk Larsen, biology professor at Luther College in Decorah, Iowa, has had students sample butterflies and compare them to historical documentation by local butterfly expert Bert Porter (see the Porter House Museum in Decorah, Iowa). Bert Porter documented 73 species of butterflies in Winneshiek County in 1908. Dr. Larson's research in 1998 found 55 species. These numbers dropped to 42 species by 2015. A research study of population trends over the past 21 years of 81 Ohio butterfly species has found a more than two percent drop compounding each year. Some of the best international research has been done in Germany (Josef H. Reichholf), verifying an over 85 percent drop in butterfly and moth abundance in Bavaria.

If there is one thing to know about butterflies it is this: they are resilient. This is why I encourage gardeners to garden with butterflies in mind. Butterflies can lay hundreds of eggs; many have multiple generations in a single growing season. Compare that to a bird that might have just a

Left: An eastern tiger swallowtail butterfly nectaring on native anise hyssop. All swallowtails overwinter in the chrysalis stage.

few eggs with even fewer species raising multiple broods in a growing season, and one can see how home gardens can be a place for numbers to increase. The return of the gray copper to my hometown habitat is a good example of the resilience of Lepidoptera. I try to be optimistic that we can turn this around. Creating better butterfly habitat will also help many other beneficial insects. After plants, beneficial insects are our best building blocks to a healthy web of life.

So, where to begin? Insect declines are mainly attributed to pesticides as well as fertilizers. Fertilizer use and production causes increased carbon dioxide and nitrogen in the atmosphere.
So, step one is: drop the fertilizers and pesticides in your landscape and support reduction and capture of carbon dioxide emissions. Why do you need pesticides in your landscape? With butterflies' amazing metamorphosis, remember that the unseen eggs, caterpillars, or chrysalises easily become non-target casualties, along with the demise of an entire suite of other beneficial insects.[1] I've found that having a good diversity of native plants (because with a diversity of native plants comes a diversity of beneficial insects), keeps pests in check all on their own. Additionally, why on Earth would I want to fertilize any plant in my landscape other than those in containers or a veggie garden? Our regionally native plants are efficient and adapted to existing soils and nutrient levels. In the Midwest where I live, we have an abundance of fertile soil. Match plants to your soil conditions and you are good to go—no additives needed.

Our changed atmosphere's impact on plants is not talked about much. Our current nearly-doubled atmospheric carbon dioxide levels and increased nitrogen deposition that results from extreme rain events have tilted the scale in favor of rank growth of invasive plants as well as aggressive native plants like sumac. Rank growth of cool season grasses and woody species—such as reed canary grass, smooth brome, and orchard grass, and brush and vine species such as gray dogwood and poison ivy—has smothered the plant diversity of landscapes which in turn has diminished the diversity of our insects, including butterflies. So, however we can reduce our own atmospheric inputs will, cumulatively, have a positive impact on wildlife. I'm excited to see a wide variety of electric lawn care equipment at retail outlets. Locally, my electric grid is using much more sustainable solar and wind sources as power plants using mined fossil fuels are phased out. Plugging electric equipment into the local grid is becoming more and more sustainable. When I had a smaller property, I had a reel push mower powered by me, which helped keep me in shape! As I reduce lawn, I plan to return to that mode of trimming the turf.

Step two is: provide habitat for butterflies. Starting with, as I just mentioned, reducing turf. Plant a diversity of mainly native plants adapted to your site conditions and reduce lawn to only what you use. By simply doing this you will inadvertently create the habitat required. Think about this: where do butterflies spend the winter? Butterfly migration is rare. Monarchs migrate, as well as a few other butterfly species.[2] But the bulk of our butterflies spend the winter in a life stage specific to each species. Most of our jewel-like hairstreaks overwinter as eggs while many butterfly species

Right: A Midwestern prairie-themed garden in the author's front yard attracts a wide variety of pollinators and beneficial insects.

overwinter as caterpillars. Some overwinter in the chrysalis stage (such as all the swallowtails). Even in frigid areas of the United States, several of our butterfly species overwinter as an adult butterfly.

Knowing how butterflies (and moths as well) overwinter, garden "clean up" needs to be reconsidered. What you prune, remove, or clear away may be a home or overwintering habitat for beneficial insects. For example, red-spotted admiral and viceroy caterpillars use the base of a leaf as a sort of sleeping (hibernating!) bag tethered with their silk to a plant. Most caterpillars, such as fritillaries, crescents, satyrs, emperors, and skippers, overwinter snuggled into the leaf litter underneath their host plants. It's a no-brainer to leave the leaves just like Mother Nature does! (Note: see "soft landings" guides for providing habitat underneath host trees.) Chrysalises attach to all sorts of stalks, branches, trunks, and human structures while overwintering adult butterflies often rest in wood piles, under the loose bark of dead trees or branches, and even outbuildings. Again, leave branches and stalks, or examine them carefully if you are removing them before consistent spring warm up.

If you use fire to rejuvenate your landscape, make sure you leave refuge areas of key host plants as none of our butterflies are adapted to survive fire while hibernating (or at any stage where they can't fly away). I've seen too many butterflies eradicated from completely burned landscapes. I've even witnessed local wildlife refuge staff over-burn without regard to a fire's impact on hibernating insect life. Shockingly, landscapes denuded by overpopulations of deer or smothered by invasive plants are showing a similar deleterious effect on butterflies.

Butterflies specifically require their host plants (the plants that their caterpillars are adapted to eat). Learn about the butterflies you have already observed or are likely to observe in your area and plant their host plants. If you plant it, they will come! It's surprising how far and wide many female butterflies disperse looking for suitable host plants to lay their eggs on. Most do better if you have natural corridors linking your residential habitat to the surrounding habitat—this can be anything from hedgerows, streams and rivers, lakeshores, wooded strips, or meadowlands. It's part of the thinking behind Home Grown National Park and landscapes using Wild Ones principles.

Adult butterflies also need sustenance. Males especially need to gather minerals required for successful reproduction and they find this in wet mud, sand or gravel, as well as on scat or even rotting fruits. All butterflies have a proboscis to collect sustenance; flower nectar is high on the menu for most, though some butterflies do get their nutrition from scat, sap, or rotting fruit. Plant a variety of plants that bloom from earliest spring through to latest fall to provide nectar for butterflies through the entire season. Many butterflies have favorite flowers to nectar from but some plants (mainly in the mint, carrot, and aster families) provide food for a diverse range of butterflies. Do a bit of local research to ensure top butterfly nectar plants for your region are in your garden.

Left (top): A monarch caterpillar eating a butterfly milkweed pod. **Left (bottom):** The iconic monarch butterfly nectaring on stiff goldenrod. While the plight of the monarch's plummeting numbers is often in the news, surveys for over two decades find a more than two percent drop compounding each year for all butterfly species.

Cheers to landscaping for butterflies! I've gardened for them ever since I became a homeowner. Welcoming them into your living space really does bring great joy. It also creates a more sustainable landscape that welcomes the rest of life to thrive and coexist. I can't imagine living without a healthy web of life comprised of all types of creatures around me. I'll never forget a neighbor walking his dog by my house who stopped to thank me because he enjoyed hearing the cacophony of crickets and other singing insects on late summer evenings as he walked past. What I take for granted is sadly not possible in many traditional, usually toxic landscapes. Because of the ecosystem services of our web of all life (everything from providing fresh oxygen, pollination services, pest control/balance of life, pollination services, food and water recycling), if you think you can live without diverse wild things, you should know that you cannot.

Alan Branhagen is a naturalist and plantsman specializing in botany, birds, and butterflies, and is the author of Timber Press' The Midwest Native Plant Primer and Native Plants of the Midwest. Alan has both a bachelor's and master's degree in landscape architecture and is the director of operations at the Minnesota Landscape Arboretum. All images are courtesy of Alan Branhagen and were photographed in his front yard.

[1]Beneficial insects are casualties of insecticides. While beneficial insects are not targeted for control, pesticides do not differentiate between insect pests and beneficial insects thus both suffer from exposure.

[2]Monarchs east of the Rocky Mountains migrate to the oyamel fir forests of central Mexico. Loss of forest habitat from illegal logging and other forest degradation diminish overwintering habitat and imperil the future of the amazing monarch migration.

Right: A soft landings planting of regionally native vegetation under regionally native host trees offers insects safe spaces to overwinter, complete lifecycles, and reproduce, and to find shelter and sustenance. **Next spread:** A banded hairstreak nectaring on a black-eyed Susan. Oak and hickory trees are the hosts for the hairstreak butterfly.

Conservation Gardening: A Gardening Imperative for the Anthropocene

by Leslie Pilgrim

I've loved gardening since I was a kid. I've engaged in this passion-bordering-on-addiction since I could ride a bike and count change. Each spring my neighbor Susie and I would hop on our bikes and pedal miles to a greenhouse in an annual ritual to purchase as many exotic looking plants as we could afford and tote home in bicycle baskets.

To get to this greenhouse—located in a neighboring city—we had to bike along an insanely busy state highway. Besides the traffic, the greenhouse was rather far away. I scratch my head wondering how we pulled this off. Not just the getting there, but being allowed to do so. Our parents must not have been paying much attention.

The halcyon era of my childhood, at least in my memory, was one in which kids were kicked out of the house in the morning on non-school days and did not need to resurface until dinner. It's impressive how much "important work" could get done within that timeframe. My younger brother (then age six) and two neighborhood friends once found this timeframe quite accommodating to embark on a pathless trek down to the Mississippi River to imagineer building a sailboat in which to sail to the Gulf of Mexico. Another story for another day.

Gardens in the suburban neighborhood where I grew up were typically set against the house and surrounded by an expanse of turf grass that extended to the road. Most gardens were planted with the traditional trinity of geranium, marigold, and petunia. But, at the magical greenhouse of my youth, my friend and I experienced a universe of lantana, fuchsia, sweet William, and so much more. It was bedazzling. My obsession with flowers followed me into young adulthood. As an apartment dweller I filled half-whiskey kegs on the back deck with begonias and impatiens. After the purchase of my first home (located in the neighborhood where I grew up and where I still live), I immediately planted the garden of my dreams.

But in the years between then and now I slowly came to understand that the plants I planted in my childhood and much of my adulthood were for me. I planted whatever I considered enchanting and I unquestioningly assumed that everything I

Left: The foundation of conservation gardening is regionally indigenous (aka, native), insecticide-free vegetation.

planted was "helpful" to nature in some generic sense. And, I never gave a passing thought to the environmental impact of my "cultural landscaping practices" such as mowing a lawn short, or "cleaning up" in the spring and fall. Looking back, I realize my gardens-planted-for-me and my landscape practices didn't do much to sustain ecosystem food-webs; provide habitat for wildlife to begin and complete lifecycles, rear their young, or find shelter; promote microbial life and healthy soil, and more. Those kinds of garden objectives were unheard of.

Today's ecosystem is a fragile house of cards. Statistics illuminate the fact of our rapidly vanishing natural world. Since the 1970s, the population of North America's birds has dropped some 30 percent. That's three billion birds gone. The charismatic monarch butterflies' U.S. population has plummeted 85 percent in the past 20 years while, overall, 40 percent of the world's entire insect population is in decline. The extinction rate has accelerated well past any natural expected rate; one estimate cited by the World Wildlife Fund indicates thousands, if not tens of thousands, of species are going extinct each year. One million plant and animal species, according to a U.N. report, are on the verge of extinction.

I don't really need the statistics to know how much things have changed. I've lived on the same block for over five decades. Mental notes of what I used to see as I ran around exploring this inner-ring suburban neighborhood as a kid remind me of what's been lost: yellow-headed blackbirds in the marsh behind city hall, killdeer near the ballfield, salamanders in the window wells (I wish I would have known to rescue them), innumerable bats, chorus frogs in the now quiet pond down the road, purple martens populating every "bird hotel," and "ditch milkweed" dripping with monarch caterpillars.

We are experiencing the "great leaving." It is sad. And alarming. But in my roles over the past decade as environmental writer, volunteer, event and festival "tabler," field crew worker, and founder of the non-profit that publishes this online magazine, I hear this over and over from the people of all ages I meet with and talk to: "I need to be a part of the solution. I want to get started. I have no idea what to do or how to begin. I'm just one person."

And here is how I respond. Anyone who "claims dirt"—whether it be in a home landscape, school yard, apartment patio, place of worship, space in a park, the strip of land between the road and sidewalk, a roadside ditch, somebody else's land or yard, city hall, public land, you name it—is an integral part of turning the great leaving into the great returning. I refer to the cumulative impact of these individual actions and choices as the "butterfly effect." Collective actions have pushed our ecosystem to the brink. Likewise, they can bring it back.

Right (top): By blending the ecosystem function of native plants with practices that strive to create biodiverse habitat, a conservation gardener authentically welcomes wildlife (from microbial life, to beneficial insects, to birds, and more) while creating something stunning for the human eye. **Right (bottom):** Conservation gardening embraces "messy." Here, leaves and plant stems remain in order to insulate, protect, and nurture wildlife. The leaf duff pictured here provides habitat for overwintering butterflies, moths and other insects. Stem cavities provide nesting spaces for the larvae of insects such as native bees.

Claiming dirt must come with a commitment of time and attention, and to continuous learning. And it must come with a resolve of robustly committing to Conservation Gardening—the foundation of which is gardening with regionally native, **insecticide-free** vegetation—as well as engaging in conservation practices.[1] Conservation practices encourage the systems that help form natural food-webs such as limiting the use of external resources, eliminating problematic inputs, and minimizing disturbance. Most of all, the conservation gardener tends to the Earth in collaboration with Mother Nature. By blending the ecosystem function of native plants with practices that strive to create biodiverse habitat, a conservation gardener authentically welcomes wildlife (from microbial life, to beneficial insects, to birds, and more) while creating something stunning for the human eye.

Since becoming a conservation gardener, I am more bedazzled than ever by flowers. But I am no longer enchanted solely by their beauty. I am also smitten by their ecosystem superpowers—and the outsized importance of regionally native trees, shrubs, vines, and grasses in our landscapes. Through conservation gardening, I have come to understand the immense potential impact of the butterfly effect. By some estimates we've got well over 40 million acres of lawn in the U.S. that could be partially removed and conserved—or, more poetically, "remeadowed"—with native vegetation. Add in open areas such as rights of way, golf courses, powerline easements, and roadsides—an estimated 599 million acres—and it's possible to imagine the very real positive environmental impact that conservation gardening could have.

Learn more about conservation gardening by visiting this landing page.

Leslie Pilgrim is the founder of Neighborhood Greening, editor of this online magazine, The Butterfly Effect, and is a conservation gardener for At Home With Nature. She volunteers with organizations such as Wild Ones and is the editor of Wild Ones Reflections, published by Wild Ones' Twin Cities chapter.

[1]Systemic insecticides are often used to grow vegetation such as trees, shrubs, flowers, and grasses. Some of these insecticides can persist in woody vegetation for years and can be long lasting in herbaceous vegetation. Unfortunately, systemic insecticides do not differentiate between the small minority of harmful insects and the vast majority of helpful or beneficial insects such as pollinators. Systemic insecticides are expressed in all parts of a tree such as: pollen, nectar, leaves, wood, fruit, roots, and sap. Any insect that consumes such parts of a treated plant (e.g., tree, shrub, or perennial) can be negatively impacted. Always ask if the vegetation you plan to purchase has been grown with systemic insecticides. If you can't get assurances that neither the grower nor the seller has used systemic insecticides, consider the consequences of planting this vegetation in a conservation garden.

Left: Collective actions have pushed our ecosystem to the brink. Likewise, they can bring it back.

Food as Sacred: The Deep Connection between Cacao and the Indigenous Bribri Culture of Costa Rica

An Interview with Mainor Ortiz Ortiz, by Sara Nelson

In 2016 I began a series of trips to Costa Rica with the intention of learning rainforest field botany. However, after apprenticing with a brilliant herbalist, chocolate maker, and Scottish Costa Rica transplant named Ancel Mitchell, my focus veered towards understanding the dynamics of the local cacao trade.[1]

Though little of the world's chocolate comes from Costa Rica today, plenty is still grown in the country and used locally. Ancel explained that the Bribri indigenous tribe of southern Costa Rica produces most of the cacao relied on by expatriate chocolate makers. The tribe receives almost none of the profit from the cacao it sells.

In Ancel's telling, this is not only unjust for the cacao growers, but is also contributing to ecological damage as growers move away from the biodiverse, rainforest-compatible cacao groves to quick-profit nonnative crops that are harmful to the environment. To make matters worse, the pivot away from cacao growing has also resulted in damage to the culture, since cacao is deeply intertwined with Bribri spiritual and community life.

Ancel's account sparked my curiosity about what kind of agricultural systems Bribri growers use. I began to wonder whether I could offer support by simply buying Bribri cacao for better prices.

The plot thickened a few months later when, back in Minneapolis, I met Mainor Ortiz Ortiz. Ortiz, a Bribri teacher and computer scientist, who had relocated to Minnesota through marriage. Mainor grew up in a remote part of the Bribri territory and is, appropriately enough, from a Bribri clan of teachers. When I explained my interest in the Bribri cacao situation, he quickly introduced me to about a dozen of his friends and relatives who grow cacao, and I was able to spend time with many of them in 2020 and 2021, learning about what cacao means to the community and the many reasons why, at least in the case of Bribri growers, selling ethically produced cacao on the world market is extremely challenging.

My time with Bribri cacao growers helped me understand, in a much deeper way, where chocolate comes from. This magical food is not just a commodity crop, but a plant whose integrity has been carefully guarded by Indigenous people. The respect Bribri people have for cacao made me examine my own relationship to this plant, and to food in general. Could I view more of the foods I eat as sacred? What historical and ecological traumas would need to be repaired?

I asked Mainor to share some of his thoughts about Bribri cacao growing practices and how he thinks about chocolate, especially since he is in the early stages of creating a company to export Bribri cacao. Our conversation follows here.

Left: Kathia Almengor and her son, Thabih, harvest cacao at Kathia's farm, Finca Integral Dilä, in the Bribi community of Suretka, Costa Rica. Kathia cultivates many plant and fruit species at Finca Dilä, and leads Sosukañir a collective of 19 women cacao farmers who offer mutual agricultural assistance to each other, in accordance with Bribri cacao farming traditions.
Previous spread: View of the forest in Arenal, Bribri Territory, Costa Rica.

SN: *Could you share a little bit about where you grew up and your family's daily life? How did your family make a living?*

MOO: Sure. In Costa Rica we have eight different tribes. My tribe is the Bribri people. I grew up in what was, and still is, a community of less than 300 people, away from development or colonialism. We don't have electricity; we don't have cars or highways. We don't have, in general, telecommunication. We don't have technology displayed. We are remote, way in the jungle where you are close and engaged with nature and with family.

I would consider my tribe hunters and gatherers. We grow a lot of different vegetables and crops like beans, corn, and rice, on our farms. We also use wild vegetables that grow in the forest. For example, there is one broccoli that we call the traditional broccoli. It grows after you clear out a lot or after you take down the trees from a big property. So it's not even something that we plant, but it just like naturally lives and grows there. So we consume a lot of wild plants. We also fish and hunt, and we have fishing and hunting celebrations that we do for fun sometimes, but also for a living. For example, we have one that's called Rëkë. That's when you dam the branch of a river and dry it out, and then you collect all the fish that are without water. It's a way we celebrate, but at the same time it's a way of living, too.

SN: *Could you describe the role of cacao in Bribri culture?*

MOO: How can I say this? Cacao is gold in my native culture. Cacao is for healing. Cacao is for sacred ceremonies. Cacao has a lot of uses in our cosmology and our spirituality and in our daily use. And so cacao, I would say, doesn't just mean cacao for us. It means more than that. It's more like a sister. It's more like a spiritual being that heals you.

Traditionally, on a daily basis, we use it for drinking in the morning with ripe banana. It is the fanciest drink you can offer someone. We also use the baby cacao for healing an injury or cut without scarring. Spiritually, we use it in the ceremony for washing the hands and face before burying someone. Cacao is the main drink for the bereavement gathering. Also for women it is very useful too. We use it when women are pregnant to help them heal and recover after giving birth and also washing their body and their hands and their faces and everything, and washing the baby after being born, and the woman after giving birth.

The cleanest thing you can wash your hand with is with cacao, because cacao is the cleanest water you can get in the spiritual world.

SN: *What does it mean for this plant to be a spiritual being?*

MOO: This goes back to the history of the creation of the universe. In our cosmovision, the universe was created by Sibö. After Sibö created the universe and the earth, the first spiritual beings he created were the spiritual beings of the trees. So the trees are human beings' oldest relatives which is why we refer to them and we can connect with them through the knowledge of spirituality and through respect to them.

Right: Roasting the beans before grinding into chocolate.

The spiritual being of the cacao was the representation of the values that Sibö wanted human beings to have. So he purified her and told her you are going to be well-known all over the world. You are going to be used for many reasons and in a great variety of ways. You will be useful for things that no other tree would be able to be used for. And so he blessed her and he purified her and said, you're going to always have the ability to heal, to purify, to have the role of a sister. After he purified her with all those characteristics, he turned her into a tree. So since then, she is the most purified spiritual being that we can ever have connection with and we can ever use for any purpose.

SN: *Would you tell me about the traditional ways of physically growing the cacao and how cacao farming can fit into being ecologically responsible?*

MOO: Yes, actually, that's a really important question. Our philosophy teaches us to see nature and land and earth as our mother. So you've got to take care of it and be always aware and conscious of what you're doing with it. Like I said, all the trees are our older brothers. So you've got to have a reason to cut them down or to take up monoculture farming, because that's violating the philosophy of taking care of the land.

We had to fight a battle one time against a company that offered to buy our cacao for a good price, but the condition for the good price was monoculture farming of the cacao. So, you're not allowed to have a laurel, you're not allowed to have a cedar, you're not allowed to have any other tree or plant in your cacao farm. And that was a 100 percent "no" for the tribe and for the people growing cacao in the territory. We are never going to do monoculture cultivation of the cacao, because we are always focused on nature and the well-being of the Earth. For hundreds of years, we've grown everything together, and that's the best way it works.

SN: *Does your personal experience growing up in a cacao growing community affect how you buy or consume chocolate in the U.S.?*

MOO: Yes. I will be honest with this one. I don't buy a lot of chocolate in the U.S. because I know it's processed. I got used to having organic cacao. I've realized how processed cacao can be, to the point where it doesn't taste like cacao anymore. But one thing that I've realized is that the value, the spiritual value, hasn't changed. Like, even here, the fanciest thing you can offer me is a piece of cacao [as chocolate], you know; that's how I take [understand] it.

SN: *For people who can't grow their own cacao, do you have thoughts about how to buy chocolate in a responsible way?*

MOO: I would say that it would be nice to dig into the roots. Meaning, understanding what cacao is, what is the story of the cacao? What does it mean not only for the Bribri

Left (clockwise from top): Traditional cacao drying process at Finca Dilä. The beans take about eight days to fully dry; Split cacao pods with pulpy seeds ready for transport; Mainor Ortiz Ortiz.

people, but what does it mean for Native Americans? What does it mean for Europeans? What does cacao mean in general for the market in the U.S.? If we're going to buy cacao, it would be nice to know where it comes from, and what it means for that community or that people. If you buy it from a middleman, you don't know if you are supporting peace behind the scenes, or supporting war behind the scenes. You're just putting your money out there without knowing the rest of the story. Cacao production involves slavery in some places. If we know the story and know all the steps of what it takes to produce, we can have a better judgment of which cacao companies to support.

SN: *Would you like to share about your efforts and plans to create a cacao business or about any other hopes or dreams you have about how Bribri people can benefit from growing cacao in the future?*

MOO: Yes. I would like to support cacao growers, teach the meaning of cacao in our culture, and support polyculture cacao farming.

SN: *Can people get in touch with you either about buying cocoa from your company or hiring you to do education about cacao?*

MOO: Yes. I'm not trying to bait people into buying cacao from me, but I am happy to share from my own personal experience and cultural perspective as a Bribri person what cacao means for the Bribri tribe.

The complete version of this interview can be found on Neighborhood Greening's blog page.

Mainor Ortiz Ortiz is a polylingual educator and mentor from the Bribri tribe of Costa Rica. He is passionate about sharing his cultural philosophy and cosmovision through technology and education. He is a computer programmer living in Minneapolis. He can be contacted at figueroaandres060@gmail.com.

Sara Nelson is an ecologist who works for the St. Paul nonprofit, Great River Greening. Her family operates Squash Blossom Farm chocolate, which produces chocolate bars from cacao grown by small farmers in Costa Rica. Sara can be contacted at saracelia@gmail.com.

Some cacao projects to visit in Costa Rica:
Finca Integral Dilä, Suretka, Costa Rica
Ancel Mitchel

[1]Chocolate is processed from raw cacao. Chocolate, cocoa, cocoa butter, and more, are produced from the seeds (often incorrectly referred to as beans) harvested from pods growing from the cacao tree.

For more on how to be a conscious consumer of chocolate, scroll to the end of the long-form version of this interview.

Right: Heirloom cacao at the farm of Daniel South (Photo credit: Daniel South).

About This Journal

About Neighborhood Greening and *The Butterfly Effect* Journal
We hope you've enjoyed *The Butterfly Effect* journal and that you look forward to receiving this free publication in your inbox twice per year. If you haven't already done so, you can sign up by clicking here. Be sure to connect with Neighborhood Greening on Facebook and Instagram to keep learning how to help green your neighborhood throughout the year.

About Neighborhood Greening
Neighborhood Greening, a non-profit organization dedicated to environmental education and stewardship, publishes *The Butterfly Effect* journal. Neighborhood Greening, an all-volunteer organization, relies solely on the donations of individuals to keep delivering you rich stories and beautiful imagery and providing stewardship of its information-packed website. Please consider supporting us with a donation of any size.

About *The Butterfly Effect* Journal
In mathematical chaos theory, the butterfly effect is the concept that a very small difference in the initial state of a physical system can make a significant difference to that state at some later time. What can this theory offer to the communities in which we live? We think it offers a lot. The cumulative effort of individual actions can positively impact the local ecosystems that comprise our lakes, streams, wetlands, yards, gardens, recreational areas, open spaces, roadsides, schools, and places of worship, and much more. Collective actions have pushed our ecosystem to the brink. Likewise, they can bring it back

In *The Butterfly Effect* journal, we celebrate community successes, examine small but impactful changes we can make to become better stewards of our local ecosystems, and tell the stories of those who are striving to green their neighborhoods. By harnessing the spirit of community, we believe focused efforts will make our neighborhoods better places to live for both humans and wildlife. There is much we can do together to positively impact our shared environment. House by house. Block by block. Neighborhood by neighborhood.

We'd Love to Hear from You!
Do you have a story or idea to share about how you or someone you know is making your neighborhood greener, more environmentally sustainable, or wildlife friendly? Please send your ideas to Green@neighborhoodgreening.org. Want ideas to green your neighborhood year round? Be sure to check out "42 Ways to Green Your Neighborhood" on Neighborhood Greening's website.

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